



Application of Problem Based Learning to Students' Improving on Mathematics Concept of Ability

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Abstract

The subjects of this research were whole the students' as many as 16 students' and all of the consisting the students' were women. The implementation of this research consists of two cycles. The instruments of the study were test and observation. The result showed that before being given the average action of the initial test around 50.31 with a complete level of learning was (25%). After doing the test class I cycle that of learning cycle I increase become 56.25%. This means an increase of 31.25% from the first test. And then after doing the test of cycles II with applying problem based learning they got the average on learning process with cycles II was 87.5%, which means they got to increase of 31.25% from the cycles I test.

Keywords: The Concept Of Ability; Problem Based Learning.

1. Introduction

Now days we are live an age, where the technological development develop very quickly, this result show that we should be able to follow it, one of manner we can follow of this development with one learning of mathematics, mathematics is greatly exploited in everyday life, hence all of teacher is very important to studying mathematics subject.

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The teacher tried to generate the students' participants who think critically, understand the concept of mathematics, and the result is good learning. It can be accepted if the teacher used kinds of learning methods, which corresponded to the material being taught. However, the fact some of teachers still many used traditional learning method that cause students' think that mathematics is not important in everyday life, so that the students do not understand the mathematics concept, until the students' have less learning outcomes. This thing which need to be interpreted by the educators [1]. The world has to change to quick and where it need to mathematics as a way to represent the change. In the century where the essentials requirement is what which we learn must be useful in everyday life to solve dynamic competition. to deal with this situation we (teacher). Want to generate critical thinking skill among learners. Although, they are many methods to teach mathematics in the world but the method will be adopted by teacher. Mathematics is a method of speech (instruction). This is an important issue in teaching mathematics, creating difficulties, less the achievement and less of mathematical concept that will be knowing with the learners.

Therefore, the science of mathematics will never accepted if someone do not trying to learn mathematics. In this below will explain some of mathematics useful. (1) by studying mathematics we are able to calculation and able to performing other calculation. (2) math is a requirement for some other subject. (3) by studying mathematics, calculation become more simple and practical. (4) by the studying mathematics is expected to be a human being to think logically, critically, be responsibility and able to solve the problem [2].

However, the fact in the preliminary data in MTs Aisyiyah showed that the activity of students' to follow the lesson still low, it is show that the students is not brave to asked question with teacher, the students' also still less to courage the answers the teacher question in the class. This is due to the teacher still using traditional learning. And does not to improve the solving ability students math problem.

So the selection of learning strategies and choosing a model of learning is one of the solution to achieve the success of learning objectives, it also can be supported with some ability mathematical problem to solving by the students get it. One such a learning model is problem based learning. Problem based learning (PBL) is a constructivist learner-centred instructional approach based on the analysis, resolution and discussion of a given problem. It can be applied to any subject, indeed it especially useful for the teaching of mathematics [4].

2. Mathematic concept Ability

The ability of mathematic concept in mathematics learning is the important key, because with some ability to concept will be easy to learning mathematics for the students. Is one way to understanding is one of the most important traits associated with the attainment of educational goals [4] Furthermore, we should able to master to concept of person to distinguish between one thing to another thing, one event to another event [5]. Mathematics plays an important role in shaping how the individual deals with various aspect of personal, social, and civil life. Mathematics is one of means to cultivate students' math skills, logical, creative, critical, meticulous, systematics, problem-solving, communication, and communication skill and representation. It is desirable after math learning can improve mathematically ability [6].

3. Problem Based Learning Model

Problem based learning is one of problem based learning model that has been known since John's Dewey, Where the problem based learning is centered of learning model. Students involving learning through problem solving through real state, and involves the relation between the stimulus and the response.

According to Dewey [7]. Problem based learning is one of the interaction between stimulus and response, it is the relationship between two directions of learning and environment. The environment give to input to the students helping and problem, while the brain's nervous system functions to interpret the aid effectively so solve the problem encountered can be investigated, assessed and analyzed, and find to solve the good problem. The students' experienced got by the environment will lead to use the materials and easy to understanding and can be used as guideline of learning objectives. "Problem Based Learning is a model students-centered instruction that involves learning through problem solving through a real circumstances. Problem based learning involve some of the presentation of authentic and meaningful situations which serves as basis for the investigation by the learners [8].

3.1 Some Step By Step Problem Based Learning Models

The learning in this study as follows the stages in the problem based learning according to Padmavathy [1].

- 1) Explain unknown wording, statements and concepts
- 2) Define the problem(s)
- 3) Brainstorm – analyze/try to explain the problem(s)
- 4) Formulate Learning Issues and Define Action To Be Taken
- 5) Self Directed Learning.
- 6) Subsequent Group Meetings: Report and evaluate on self-directed learning. Refine learning issues and define further action.
- 7) Report Phase. Resolution of problem. Evaluation of process.

3.2 The Characteristics Of Problem Based Learning Model

According to Amir [9]; the characteristics covered in the problem base learning process as follow:

- a. Problem is always used in the beginning when the learning process begin
- b. Usually the problem used as a real world problem for the presented in the flood (ill structured)
- c. The problem is usually based on the multiple perspective is one solution for the learners to using and getting some of concept of some chapter in the university or the path of science to the other field. Problem make the learners challenged to gain learning in new learning areas. The highly self to study by ourselves (self directed learning). Utilize of variety of knowledge resource, not only from the single source. The research, evaluation and use of this knowledge is more become important key.
- d. Collaborative learning, communicative, and cooperative learning. The learners works in groups, interact, teach each the other (peer teaching) and do the presentation.

4. Methods

The researcher used in this study is classroom action research that have purpose to know the ability of students concepts of mathematics by problem based learning. In this research all of students' VIII MTs Aisyiyah consist of 16 (sixteen) students.

This research doing in MtsAisyiyah in JalanDemak No. 3 Medan. In the second semester during the 6 month meeting times for the control class. The free variable is used problem based learning, while the dependent variable is a problem solving to the students mathematics ability.

5. Research Finding

The description of this research to collect the data of the students' learning, observation of students' mathematical concept to the ability on the subject of tangent circle, as follow;

5.1 The Description of Student's Learning Complicated

Based on the result of this research mathematic learning students, we can the description as the table below.

Table 5.1: Percentage Students Mastery Learning classically of cycle I

No	Keterangan	Siklus I	Siklus II
1	The Highest Value	80	90
2	The lowest value	50	74
3	Number of Not Complicated Students	7	1
4	Unfinished Student Presentations	43.75%	12.5%
5	Number Of Complicated Students	9	14
6	Percentage of Complicated Students	56.25%	87.5%
7	Average	72.31	79.5

From the percentage of students learning as classically in I cycle the students who accepted the in the classical was 9 students cause the students' not get it the minimum completeness criteria (KKM) determined by MTs Aisyiyah with the percentage of 56.25%, while the number of students' who not get it of learning is amounted to 7 students who get the percentage 43,75%. From the percentage of students' learning competence classically in the second cycle has increased, the obtained number of students who achieve mastery by classical amounted to 14 students and has the number of percentage of 87,5 %. While the number of students who have not studies masculinity amounted to 2 students who have the percentage of 12,5%

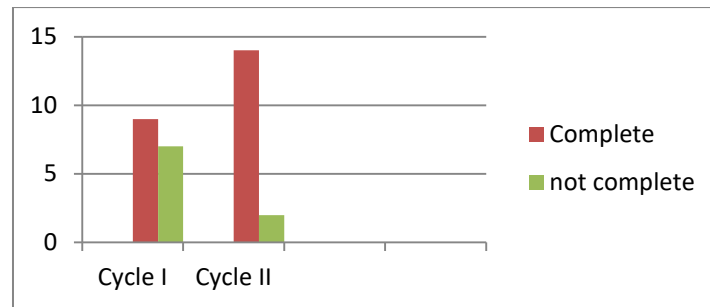


Figure 5.1: Graph Of Percentage Of Student Learning Result In Cycle I And Cycle II.

So from the picture above we can be seen that complete of students' mathematical in a classical relative increased from cycle I to II.

5.2 Data Descriptions of Observations of Students' Math Concepts

As for the description of the result of the assessment of students' mathematical concepts as follows:

Table 5.2: Result of Observation Ability Mathematics Concept of Student Cycle I and Cycle II

No	Rated Aspect	Score	Score
		Cycle I	Cycle II
1	Interest	2.75	3.62
2	Attention	2.68	3.62
3	Participation	2.5	3.37
4	Percentage	2	3.5
The number of students is good reasoning		4	14
The number of students is less reasoning		10	2
The number of students is very less reasoning		2	
Total skor		39.25	48,75
Rata-rata		2.45	3.04
Category		Less	Good

From table 4.1 we can look above that the ability of students' mathematical concept in the cycle I of the highest assessment on the aspect that is assessed to the interested; this is a good stages, especially on the tangent of the circle by using problem base learning model that equal to 2.27. in this stage the students' also get to the aspect that is considered to be of higher who has get more interest. While the lowest is phase percentage, that is equal to 2. Observation to the ability of students math concept at cycle I to get by all who have the average of 2.45. so there is the included in the category less. The result of the observation is the ability of students mathematics concept of cycle II show that most assessment to high based on the criteria on the aspect that are assessed is

more interest and attention, the equal show that 3.62.. The lowest is the stage of participation and percentage that equal to. 3.37, the observation to the ability of mathematical concepts of cycle II is obtained to have the average of 3.04 so that included in good category,

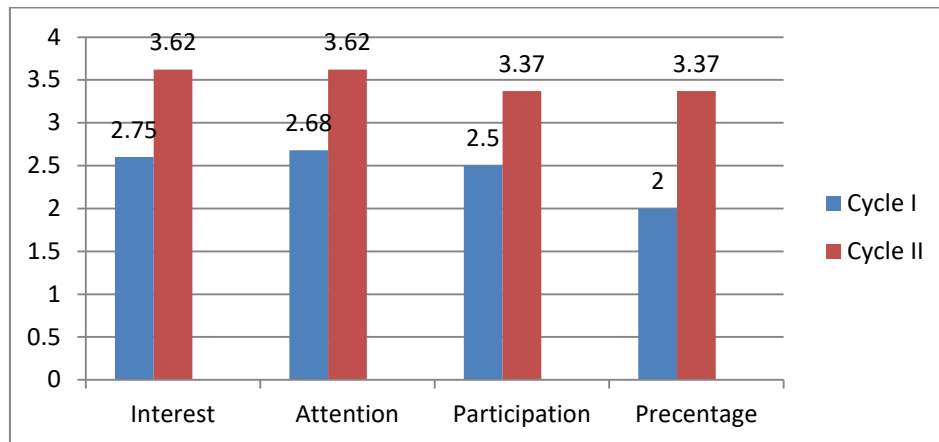


Figure 5.2: Graph of The Result Observation Ability Of Students Mathematics Concept Cycle I And Cycle II.

So from the picture above we can be seen that the ability of students' mathematical concept in a classical relative increased from cycle I to II.

6. Discussion

The research with the problem based learning has been widely practiced. In generally, the result of studies can improve the ability of the learners. The study who had title "The Effectiveness Of Problem Based Learning In Mathematics Effectiveness Of Problem Based Learning In Mathematics" that with one problem based learning model, as a whole has improve students' critical thinking ability, problem solving is more than higher to conventionally taught the students [1]. Almost the similarity with the research title "*Effect Of Problem-Based Learning On Senior Secondary School Students' achievements In Further Mathematics*", show that problem based learning Improve performance in both cognitive and non-cognitive outcomes [10]. Furthermore, the title of "*The Effects of Problem Based Learning on Mathematics Performance and Affective Attributes in Learning Statistics at Form Four Secondary Level*", show that problem based learning Applying problem-based learning model, Performance and affective of students in learning statistics at increasing middle level and students feel more interested in learning mathematics [11]. Furthermore, the title of "*Effects of Problem-Based Learning on Attitude: A Meta-Analysis Study*", show that applying problem based learning effective in helping students gain a positive attitude toward courses [12]. Furthermore, the title of "Problem Based Learning And Mathematics, Possible Synergical Actions" show that problem based learning in the student centered can improve the students activity [3]. Furthermore, the title of "*Effect Of Problem-Based Learning On Senior Secondary School Students' Achievement Intrigonometry In Northern Educational Zone Of Cross River State, Nigeria*" show that Implementing problem-based learning model at high school level can improve students' learning mastery [13]. Learning theory is one guide for teacher to assist student developing cognition, emotion, social and spiritual.

6.1 Theory of Learning Constructivism

New theories in educational psychology are grouped into constructivism learning theory. This constructivism theory states that students must find their own and transform complex information, check new information with old rules, and revise it if the rules are not appropriate. For students to really understand and be able to apply knowledge, they must work to solve problems, find their own allies, and try hard with their own ideas [14]. According to this theory of constructivism, one of the most important principles in educational psychology is that teachers are not just giving knowledge to students. The student must build his own knowledge in his mind. Teachers can make it easy for this process by allowing students to discover or apply their own ideas and teach students to become aware and consciously use their own strategies for learning.

6.2 Theory of Cognitive Development

The cognitive learning theory was first introduced by Piaget. According to him, cognitive development is largely determined by the manipulation and active interaction of children with the environment. Piaget is convinced that physical experiences and environmental manipulation are important for developmental change. Social interaction with peers, especially the argument and discussion helps clarify the thinking that ultimately contains the thought becomes more logical [14]. In Piaget's theory, every individual at the time from the newborn to the age of adulthood experienced four levels of cognitive development. Four levels of cognitive development include [15]:

- Sensory-motor (birth-2 years)
- Pre-operational (2-7 years)
- Concrete operations (7-11 years)
- Formal operations (11 years old - adults)

The Piaget Development Theory, sees cognitive development as a process in which children actively build meaning systems and understand reality through their experiences and interactions.

6.3 The Invention Theory of Jerome Bruner

The most basic learning theory underlying PBL learning is the discovery learning theory developed by Jerome Bruner in 1966. Bruner considers that learning to discover according to the active search for knowledge by humans, and in itself gives the best results. Trying to solve the problems themselves and the accompanying knowledge produces a truly meaningful knowledge [12]. Bruner suggests that students should learn through active participation with concepts and principles, so they are encouraged to gain experience, and conduct experiments that allow them to discover the principles themselves.

7. Conclusion and Recommendations

7.1 Conclusion

Cycle I

Based on the observation of the class I cycle action research showed in the problem based learning model with mathematics learning is to be effective. Because the students more active in asking and giving response to the material presented. Based on the result of this research class I cycle action in students mathematic learning is more increases. From the 16 students, who scored 75 to top 9 students 56.25%.

Cycle II

Based on the observation of the class I cycle action research showed in the problem based learning mathematics in the class VIII MTs Aisiyiah proved effective, because students are more affectively to asked, more exited, enthusiastic, and happy when the learning process directly. Based on the result in the class cycle II with applying problem based learning model was the result of students learning on increasing math learning. From the 16 students, who get score 75 are 14 students around 87,5%

7.2 Recommendations

Based on the result of this research, discussion, conclusions, and suggestion are expected to be useful for:

- For the headmaster of school MTs Aisiyiah to presumably can pay more attention to the students and can be more working together with all of teacher to improving and the ability to concept and students' learning outcomes, to form the good morality of the students and not the coaching and improvement and direction to the students.
- For the teacher Mts. Aisiyiah should be master in the modern learning such as problem based learning model so the learning can be alive when the learning process directly. Be varied and proven to be effective to improve learning outcomes. Teacher should be able to maintain and nature the active involvement of students within the learning activities in learning process to make the students become be better.
- For the students' are expected always to study hard, always loving in every subject and materials, and enhanced creatively and always be active in learning process to produce a good of understanding of learning material.

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